PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-216503
(43)Date of publication of application : 02.08.2002

(51)Int.Cl. F21S 8/04
F21V 7/00
F21V 8/00
H01L 33/00
// F21Y101:02

(21)Application number : 2001-003474
(22)Date of filing : 11.01.2001

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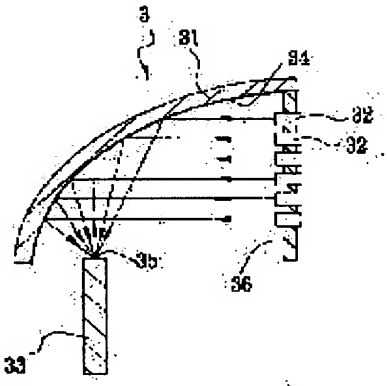
(54) MULTI-LIGHT-SOURCE LIGHT CONDENSING APPARATUS

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a multi-light-source light condensing apparatus that has a long life and a wide dynamic range, with small amount of heat, and is excellent in color rendering.
SOLUTION: A light source unit 32 is constituted of a plurality of light emitting diodes or laser diodes of the three primary colors, and are arranged on an upright substrate 36 and disposed at prescribed positions. One end of the substrate 36 is mounted, by bonding, to the inside end edge of a reflection mirror 31, with all the light source units 32 correspondingly facing the reflection surface 34 of the reflector 31. The light emitted irradiates the reflection surface 34 of the reflector 31 in parallel, and then converges on the focal point 36 and further enters an integrator 33 to be rendered uniform for use in the successive optical path.



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[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

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CLAIMS

[Claim(s)]
[Claim 1] The reflector equipped with the reflector by the curved-surface reflecting mirror of predetermined die length and each meet said reflector, and arrange any in three primary colors or two or more monochromatic light emitting diodes in a predetermined array. The whole of each beam of light to discharge according to said reflector The multi-light source beam condensing unit characterized by coming to contain the light source unit reflected and the integrator with which are formed in reflector one side of said reflector, converge, and are made to equalize said reflected beam of light, and consecutiveness processing is presented.
[Claim 2] It is the multi-light source beam condensing unit according to claim 1 which makes it the description as said reflector becomes with the curved-surface reflecting mirror which presents parabolic [of predetermined die length], and a focus is connected to one point of a reflector, said integrator end is arranged at said focus, the beam of light of said light source is parallel, incidence of said reflecting mirror is carried out to said reflector, it converges at said tip of an integrator by reflection of said reflector and it comes to go to along said integrator.
[Claim 3] Said reflector is the multi-light source beam condensing unit according to claim 1 with which a focus is connected to two points, said integrator is located in one focus in an end, and a reflector makes it the description as it comes to go to along said integrator through reflection of said reflector further after the beam of light of said light source converges on the focus of another side with a curved-surface reflecting mirror.
[Claim 4] Have the 1st and 2nd reflector formed with the curved-surface reflecting mirror of predetermined die length, said 1st reflector carries out field correspondence at said the 2nd reflector and predetermined include angle, and said integrator is located in the 2nd focus. Multi-light source beam condensing unit according to claim 1 which makes it the description as project on the 2nd reflector continuously after the beam of light which two or more light sources discharged carried out focusing passage of the 1st focus, irradiating the 1st reflector further and being reflected in parallel, respectively, and it is reflected, it converges on the 2nd focus and it comes to go to along an integrator.
[Claim 5] The multi-light source beam condensing unit according to claim 1 with which an emission exposure is carried out in the reflector of said reflector, and said reflector is characterized by carrying out [reflect as a parallel ray further and] incidence into a lens matrix integrator and coming to make after focusing projection of the beam of light of two or more light sources is carried out for said reflector with a curved-surface reflecting mirror at the focus of said reflector.
[Claim 6] Claim 1 characterized by coming to constitute said two or more light sources with two or more three-primary-colors laser diodes, 2 or 3, or a multi-light source beam condensing unit given in 4 or 5.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a multi-light source beam condensing unit, and relates to the beam condensing unit which converges and presents consecutiveness processing with those beams of light especially by making much three-primary-colors light emitting diodes (LED) or laser diodes (Laser Diode) into the light source.
[0002]
[Description of the Prior Art] With development of a multimedia information, AV (Audio Visual) signal information is fidelity-like, and freshly, this contractor developed the equipment which software and hardware combined, and the part is taken to offer the optimal operating environment so that automatically. If it says from the display in output equipment, this display is formed of many member devices, through steps, such as a series of ****, an integral, a spectrum, modulation, and photosynthesis, it will be projected on the light beam from the light source by the display, and imaging ** and appreciation will be presented with it. And in order to optimize the function of a display, this contractor investigates the "light source" which is the origin of a display, can express the high color rendering properties of the natural color for which the use light source presses truly, and he is ****(ing) so that advanced effectiveness, a long life, high safety, etc. can be obtained collectively.
[0003] Drawing 5 is the lighting system 1 of a certain conventional example, and is equipped with the parabolic reflector 11. This reflector 11 has the 1st focus 12 and 2nd focus 13 in two places of space. The arc light 14 is formed in the 1st focus 12 of a reflector 11, the end of the cylindrical integrator 15 is arranged to the 2nd focus 13 corresponding to it (that is, the integrator 15 back end is located in the 2nd focus 13), incidence of the uniform beam of light is carried out from the front end of an integrator 15, and substage condensers 16 and 17, a spectroscope (it does not display all over drawing), etc. in a consecutive light path are presented. The light source will discharge light on all sides, if the arc light 14 is lighted, and it converges on the integrator 15 which this light reflects positively and has it in the 2nd focus 13 in parabolic reflector 11 peripheral wall of back and a perimeter. And the next processing etc. is received after being transmitted to other consecutive processors, carrying out filtration removal of the invalid beams of light, such as purple/infrared radiation (UV/IR), from this source of the white light, after passing through processing of an integrator 15 and both the spectroscopes 16 and 17, and separating into a light of red, green, and blue (R, G, B) in three primary colors further.
[0004] An example and a lighting system 2 are already shown in drawing 6 as a conventional example. hang over a parabolic reflector 22 -- it has ****** 21 and both the lens matrix integrators 23 and 24 are formed at suitable spacing for the predetermined distance of the light source 21 front. The light discharged from this light source 21 is reflected by the parabolic reflector 22, after becoming the parallel ray on which it is projected positively, and this parallel ray's carrying out incidence to both the lens matrix integrators 23 and 24 and receiving processings, such as **** and a spectrum, it projects on a liquid crystal display 25, and output IMEJINGU is controlled by the control circuit.

[0005] although the source of the illumination light used for the lighting systems 1 and 2 of the example of since [above-mentioned] both ** has a halogen lamp, the various arc lights (Arc Lamp), for example, a high pressure mercury vapor lamp, a metal halogenation LGT, a xenon lamp (Xenon Lamp), etc., these light sources have the problem which does not result in the still more following ideals on structure.
(1) : with an impure light color -- approximate all of these light sources to a white glare, and pass steps, such as **** and a spectrum, first before projection -- carry out the spectrum of the white light to red, green, and a blue (R, G, B) three-primary-colors light, and with photosynthesis prism, converge and use this three-primary-colors light for IMEJINGU of consecutiveness after an appropriate time. the time of carrying out the spectrum of ** and this white light to three-primary-colors light -- a spectrum -- limitations, such as engine performance of a means, -- nothing [pure] perfect -- it is difficult to separate into a coarse three-primary-colors light, and a color is impure and reliability is low.
(2) : with the narrow dynamic range (Color Dynamic Range) of a color -- since the light color is impure as mentioned above, combination of each color is difficult, and since the dynamic range of the color obtained is comparatively narrow, there is a low problem of the color rendering properties which expressing a natural color says as difficulty.
(3) : with a short life -- the use life of these light sources is short, and is high the top where consumption of power is intense. [of calorific value] This generation of heat requires the danger of bringing bad effect to the life and function of a circumference facility, and exploding to them, by ****. If any or the light source also carries out failure, a whole display will not work.
(4) : with high cost -- when filtration removal of the invalid beams of light, such as ultraviolet rays and infrared radiation (UV/IR), must be carried out, cost is high in order to require accessories, such as a still more nearly special filter lens.
[0006]
[Problem(s) to be Solved by the Invention] The place which this invention was made in view of such a trouble, and is made into the purpose has a long use life, it has a large dynamic range and calorific value is also offering the low multi-light source beam condensing unit which was excellent in color rendering properties.
[0007]
[Means for Solving the Problem] The reflector with which this invention was equipped with the reflector by the curved-surface reflecting mirror of predetermined die length in order to attain the technical problem mentioned above, The light source unit in which each meets a reflector, and arranges any in three primary colors or two or more monochromatic light emitting diodes in a predetermined array, and the whole of each beam of light to discharge is reflected by the reflector, It is the multi-light source beam condensing unit characterized by coming to contain the integrator with which is formed in reflector one side of a reflector, converges, and is made to equalize the reflected beam of light, and consecutiveness processing is presented.
[0008] Moreover, it considers as the curved-surface reflecting mirror with which a reflector presents parabolic [of predetermined die length], and a focus is connected to one point of a reflector, an integrator end is arranged at said focus, the beam of light of the light source is parallel, incidence is carried out to a reflector, it converges at the tip of an integrator by reflection of a reflector, and a reflecting mirror may be made to go to along an integrator.
[0009] Or a reflector may be made to go to along an integrator through reflection of a reflector further, after a reflector connects a focus with a curved-surface reflecting mirror to two points, an integrator is located in one focus in an end and the beam of light of the light source converges on the focus of another side.
[0010] Moreover, have the 1st and 2nd reflector formed with the curved-surface reflecting mirror of predetermined die length, the 1st reflector carries out field correspondence at the 2nd reflector and predetermined include angle, and an integrator is located in the 2nd focus. After the beam of light which two or more light sources discharged carries out focusing passage of the 1st focus, irradiates the 1st reflector further and is reflected in parallel, respectively, it is continuously projected and reflected in the 2nd reflector, converges on the 2nd focus, and may be made to go to along an integrator.

[0011] Furthermore, after focusing projection of the beam of light of two or more light sources is carried out for a reflector with a curved-surface reflecting mirror at the focus of a reflector, an emission exposure is carried out in the reflector of a reflector, and a reflector reflects as a parallel ray further and may be made to carry out incidence into a lens matrix integrator.
[0012] this invention constituted as mentioned above converges a light beam on an integrator with the structure property of a reflector by making a direct monochrome wavelength light emitting diode or a direct laser diode in three primary colors into the light source, and is used for consecutiveness processing -- it can make -- the light source -- originally -- since -- since it consists of wavelength pure red, green, and blue in three primary colors, even if it passes through photosynthesis processing, it is easily separable into three-primary-colors light [****] without still purer various colors. Moreover, since the light color is pure, and the combination preparation of each color can be carried out easily, there are no invalid beams of light, such as ultraviolet rays and infrared radiation, the top where the life of these light emitting diodes or a laser diode is long while the dynamic range of the color which can be formed is large and it is not necessary to perform **** processing, there is also an advantage which can exclude a filter lens on a facility.
[0013]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained to a detail based on a drawing. It is the 1st example in the multi-light source beam condensing unit of this invention which is shown in drawing 1 . Using many three-primary-colors light emitting diodes (LED) or laser diodes (Laser Diode), it converges on the light source and those beams of light are used for consecutiveness processing at it. the multi-light source beam condensing unit 3 -- a spectrum -- it is prepared behind a processing facility and a reflector 31, the light source unit 32, and an integrator 33 are included.
[0014] Among those, it is the curved-surface reflecting mirror of predetermined die length, and if it has a reflector 34 and a focus 35 and the light source is put on a focus 35, a reflector 31 produces a perfect parallel ray theoretically, and also when reverse, it will be formed so that similarly.
[0015] The light source unit 32 is assembled with light emitting diode (LED) or a laser diode (Laser Diode) two or more red, green, and blue (R, G, B) in three primary colors, is arranged by the erection substrate 36, and is prepared in a position. After pasting the reflecting mirror 31 medial-surface edge, attaching the end of this substrate 36, making the light source unit 32 face the reflector 34 of the above-mentioned reflector 31 wholly and irradiating those emitted parallel rays at a reflector 31, it enables it to converge on a focus 35.
[0016] An integrator 33 is a rod-like beam-of-light equalization member, is connected under the focus 35 of the reflecting mirror 34 of the above-mentioned reflector 31, and is installed downward. It is arranged, and the edge which adjoined the reflecting mirror 34 of an integrator 33 can equalize the light beam which they-converged, and can make it use it for consecutiveness processing so that it may be exactly located in the focusing part after reflection of the above-mentioned light source.
[0017] When starting and using it, the beam of light discharged from two or more light sources 32 on a substrate 36 irradiates the reflector 34 of a reflector 31 in parallel. This beam of light is reflected and it converges on a focus 35, and after carrying out incidence and being further equalized in an integrator 33, it is used for the processing in consecutive optical pass.
[0018] It is the 2nd example of this invention which is shown in drawing 2 . Similarly, the multi-light source beam condensing unit 4 converges, presents use of consecutiveness processing with those beams of light by making two or more three-primary-colors light emitting diodes (LED) or laser diodes (Laser Diode) into the light source, and contains a reflector 41, the light source unit 42, and an integrator 43. If a reflector 41 is equipped with a reflector 44 and both the foci 45 and 46 and puts the light source on one focus 45 with the curved-surface reflecting mirror of predetermined die length, the discharge beam of light of this light source will be theoretically reflected in a reflector 44, and it will converge on the another side focus 46. Two or more light sources with many red, green, blue (R, G, B) three-primary-colors light emitting diodes (LED), or laser diodes (Laser Diode) It is assembled, it is arranged by the hemispherical substrate 47 in a

position array, the suitable part of the reflector 44 of the end of a reflector 41 is decorated with a substrate 47, and the light source unit 42 is made to face one focus 45 of the above-mentioned reflector 41 wholly. Those emitted beams of light After making it converge, a reflector 44 is irradiated and it is made to converge on the another side focus 46 further. An integrator 43 is a rod-like beam-of-light equalization member, is positioned in the focus 46 of another side of the above-mentioned reflector 41, and carries out set processing of the light beam which converged on the another side focus 46. In addition, a substrate 47 may be formed in other configurations and, in short, the beam of light of the light source should just pass along one focus 45.

[0019] It is the 3rd example of this invention which is shown in drawing 3 , and similarly, the multi-light source beam condensing unit 5 converges, presents use of consecutiveness processing with those beams of light by making two or more three-primary-colors light emitting diodes (LED) or laser diodes (Laser Diode) into the light source, and contains the 1st reflector 51, 2nd reflector 52, light source unit 53, and integrator 54. The 1st reflector 51 is the curved-surface reflecting mirror of predetermined die length, and is equipped with the 1st reflector 55 and 1st focus 56, the 2nd reflector 52 is the curved-surface reflecting mirror of predetermined die length similarly, is equipped with the 2nd reflector 57 and 2nd focus 58, leaves it at suitable spacing, and it is prepared in mirror plane correspondence at the 1st reflector 51 side. The 2nd reflector 57 carries out a looks pair to the 1st reflector 55 at a predetermined include angle.

[0020] Two or more of these light sources are also assembled with two or more red, green, blue (R, G, B) three-primary-colors light emitting diodes (LED), or laser diodes (Laser Diode), and are arranged in the hemispherical substrate 59 by the position array. The suitable part of the 1st reflector 55 of the end of the 1st reflector 51 is decorated with a substrate 59, the light source unit 53 is made to face the 1st focus 56 of the above wholly, those emitted beams of light converge, and it passes along the 1st focus 56. The integrator 54 is a rod-like beam-of-light equalization member, and is positioned in the 2nd focal 58 part. And when starting and using it, two or more light sources 53 on a substrate 59 discharge a beam of light, and the discharged beam of light carries out focusing passage of the 1st focus 56, and the 1st reflector 55 is irradiated, and it is reflected by the parallel ray, respectively. Then, it is projected again in the 2nd reflector 57, and reflective focusing is carried out at the 2nd focus 58 54, i.e., an integrator, and further, the light beam which converged enters at an integrator 54, and it is processed. Among those, what is necessary is to form in other configurations, and for the discharge beam of light of the light source to converge on the 1st focus 56, and just to be able to pass a substrate 59.

[0021] It is the 4th example of this invention which is shown in drawing 4 , and similarly, the multi-light source beam condensing unit 5 converges, presents use of consecutiveness processing with those beams of light by making two or more three-primary-colors light emitting diodes (LED) or laser diodes (Laser Diode) into the light source, and contains a reflector 61, the light source unit 62, and the lens matrix integrator 63. Among those, it is the curved-surface reflecting mirror of predetermined die length, and a reflector 61 is equipped with a reflector 64 and a focus 65, and two or more light sources are also assembled with two or more red, green, blue (R, G, B) three-primary-colors light emitting diodes (LED), or laser diodes (Laser Diode), and it is arranged in the hemispherical substrate 66 by the position array. After decorating one side of a reflector 61 with this substrate 66, making the light source unit 62 face the focus 65 of the above-mentioned reflector 61 wholly and making a focus 65 carry out focusing passage of those emitted beams of light, a reflector 64 is irradiated and it is made to reflect as a parallel ray. The lens matrix integrator 63 is positioned in the other side of this reflector 61, the above-mentioned parallel ray goes into the lens matrix integrator 63, and consecutive processing is performed. In addition, it is **** about forming in other configurations, however the beam of light of the light source converging, and a substrate 66 passing along a focus 65.

[0022] As mentioned above, according to the gestalt of operation of this invention, compared with the conventional technique, there are the following desirable advantage and effectiveness.

(1) Make direct light emitting diode (LED) or a direct laser diode (Laser Diode) in three primary colors into the light source. : with a pure light color -- a light beam is converged on an integrator

with the property of a reflector, and it is used for consecutiveness processing -- making -- **** -- the light source -- originally -- since, since it consists of wavelength pure red, green, and blue (R, G, B) in three primary colors Even after passing through photosynthesis processing, it is separable into three-primary-colors light [****] without various colors, and it is still easily pure and reliability is [the formed color is pure and] high [a color].
(2) : with the large dynamic range of a color -- the dynamic range of the color which the combination preparation of the property of each color can be carried out, and can moreover form it easily from a light color being pure so that the above may show -- large -- becoming -- a mass color -- being generated -- quality -- high color rendering properties can be announced.
(3) : with a long life -- the life of light emitting diode (LED) or a laser diode (Laser Diode) is long, low-battery actuation can be performed and, also as for calorific value, whenever [insurance] is high a low top. If it can be used continuously, and it breaks down since it is the single light source like the conventional technique even if some LED of them breaks down, ****** will become that it not said less there is not.
(4) : with low cost -- since there are no invalid beams of light, such as ultraviolet rays and infrared radiation (UV/IR), and it is not necessary to execute a **** step, a filter lens can be excluded on a facility and cost can be mitigated.
[0023] As mentioned above, although the suitable operation gestalt of the multi-light source beam condensing unit concerning this invention was explained referring to an accompanying drawing, this invention is not limited to this example. If it is this contractor, it will be clear that it can hit on an idea in the criteria of the technical thought indicated by the claim for various kinds of examples of modification or examples of correction, and it will be understood that it is what naturally belongs to the technical range of this invention also about it.
[0024]
[Effect of the Invention] As mentioned above, as explained to the detail, according to this invention, a use life is long, it can have a large dynamic range and the multi-light source beam condensing unit also with low calorific value which was excellent in color rendering properties can be offered.

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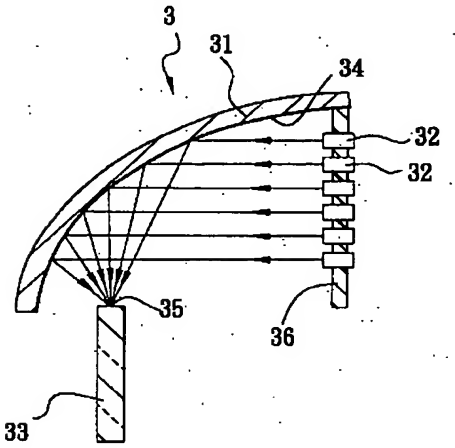
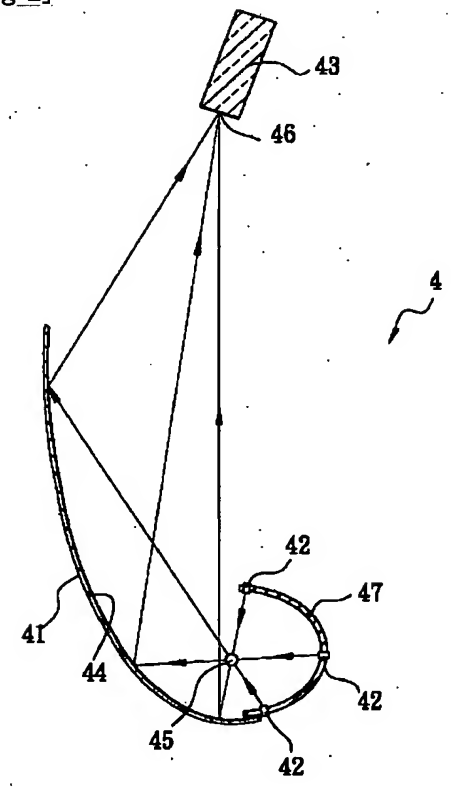
DRAWINGS

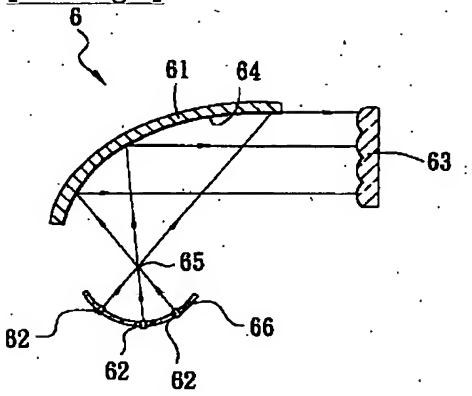
[Drawing 1]



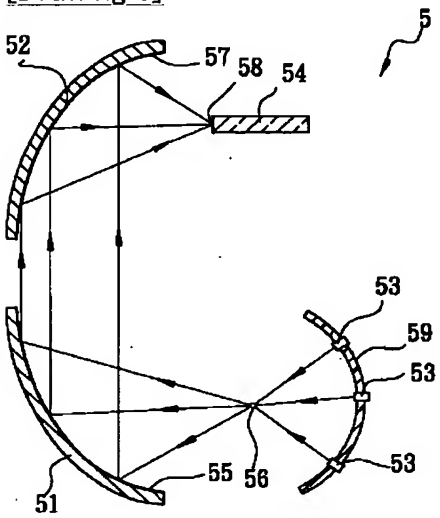
[Drawing 2]



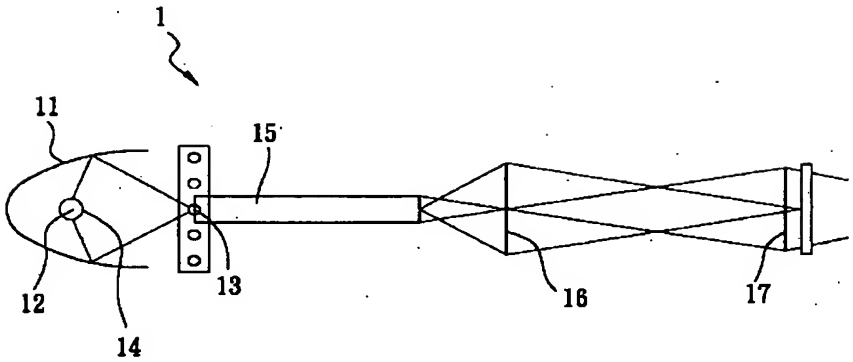
[Drawing 4]



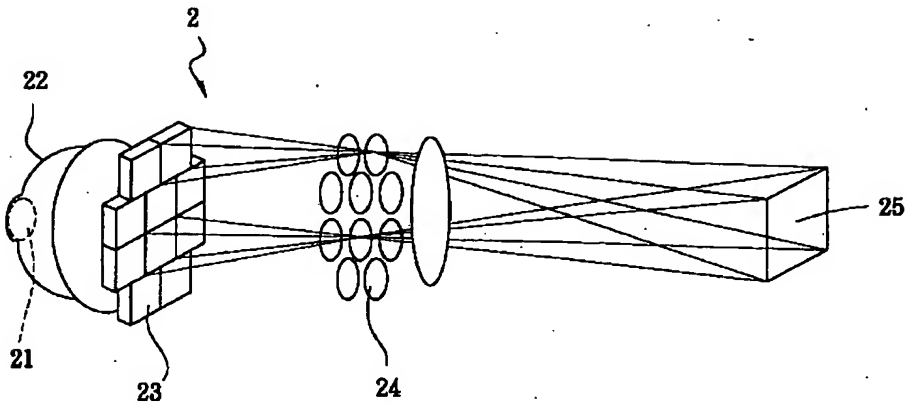
[Drawing 3]



[Drawing 5]



[Drawing 6]



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